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ANNUAL REPORT
OF
THE CURATOR
OF THE
MUSEUM OF COMPARATIVE ZOOLOGY
AT HARVARD COLLEGE
TO THE
PRESIDENT AND FELLOWS OF HARVARD COLLEGE
FOR
1910-1911.

CAMBRIDGE, U. S. A.:
PRINTED FOR THE MUSEUM.

1911.

REPORTS ON THE SCIENTIFIC RESULTS OF THE EXPEDITION TO THE EASTERN TROPICAL PACIFIC, IN CHARGE OF ALEXANDER AGASSIZ, BY THE U. S. FISH COMMISSION STEAMER "ALBATROSS," FROM OCTOBER, 1904, TO MARCH, 1905, LIEUTENANT COMMANDER L. M. GARRETT, U. S. N., COMMANDING, PUBLISHED OR IN PREPARATION: —

- A. AGASSIZ. V.¹ General Report on the Expedition.
A. AGASSIZ. I.¹ Three Letters to Geo. M. Bowers, U. S. Fish Com.
A. AGASSIZ and H. L. CLARK. The Echini.
H. B. BIGELOW. XVI.¹⁶ The Medusae.
H. B. BIGELOW. The Siphonophores.
R. P. BIGELOW. The Stomatopods.
O. CARLGREN. The Actinaria.
S. F. CLARKE. VIII.⁸ The Hydroids.
W. R. COE. The Nemerteans.
L. J. COLE. XIX.¹⁹ The Pycnogonida.
W. H. DALL. XIV.¹⁴ The Mollusks.
C. R. EASTMAN. VII.⁷ The Sharks' Teeth.
W. G. FARLOW. The Algae.
S. GARMAN. XII.¹² The Reptiles.
H. J. HANSEN. The Cirripeds.
H. J. HANSEN. The Schizopods.
S. HENSHAW. The Insects.
W. E. HOYLE. The Cephalopods.
W. C. KENDALL and L. RADCLIFFE. The Fishes.
C. A. KOFOID. III.³ IX.⁹ XX.²⁰ The Protozoa.
C. A. KOFOID and J. R. MICHENER. The Protozoa. XXII.²²
P. KRUMBACH. The Sagittae.
R. VON LENDENFELD. XXI.²¹ The Siliceous Sponges.
H. LUDWIG. The Holothurians.
H. LUDWIG. The Starfishes.
H. LUDWIG. The Ophiurans.
G. W. MÜLLER. The Ostracods.
JOHN MURRAY and G. V. LEE. XVII.¹⁷ The Bottom Specimens.
MARY J. RATHBUN. X.¹⁰ The Crustacea Decapoda.
HARRIET RICHARDSON. II.² The Isopods.
W. E. RITTER. IV.⁴ The Tunicates.
ALICE ROBERTSON. The Bryozoa.
B. L. ROBINSON. The Plants.
G. O. SARS. The Copepods.
F. E. SCHULZE. XI.¹¹ The Xenophyphoras.
H. R. SIMROTH. The Pteropods and Heteropods.
E. C. STARKS. XIII.¹³ Atelaxia.
TH. STUDER. The Alcyonaria.
JH. THIELE. XV.¹⁵ Bathysciadium.
T. W. VAUGHAN. VI.⁶ The Corals.
R. WOLTERECK. XVIII.¹⁸ The Amphipods.
W. McM. WOODWORTH. The Annelids.

¹ Bull. M. C. Z., Vol. XLVI., No. 4, April, 1905, 22 pp.

² Bull. M. C. Z., Vol. XLVI., No. 6, July, 1905, 4 pp., 1 pl.

³ Bull. M. C. Z., Vol. XLVI., No. 9, September, 1905, 5 pp., 1 pl.

⁴ Bull. M. C. Z., Vol. XLVI., No. 13, January, 1906, 22 pp., 3 pls.

⁵ Mem. M. C. Z., Vol. XXXIII., January, 1906, 90 pp., 96 pls.

⁶ Bull. M. C. Z., Vol. L., No. 3, August, 1906, 14 pp., 10 pls.

⁷ Bull. M. C. Z., Vol. L., No. 4, November, 1906, 26 pp., 4 pls.

⁸ Mem. M. C. Z., Vol. XXXV., No. 1, February, 1907, 20 pp., 15 pls.

⁹ Bull. M. C. Z., Vol. L., No. 6, February, 1907, 48 pp., 18 pls.

¹⁰ Mem. M. C. Z., Vol. XXXV., No. 2, August, 1907, 56 pp., 9 pls.

¹¹ Bull. M. C. Z., Vol. LI., No. 6, November, 1907, 22 pp., 1 pl.

¹² Bull. M. C. Z., Vol. LII., No. 1, June, 1908, 14 pp., 1 pl.

¹³ Bull. M. C. Z., Vol. LII., No. 2, July, 1908, 8 pp., 5 pls.

¹⁴ Bull. M. C. Z., Vol. XLIII., No. 6, October, 1908, 285 pp., 22 pls.

¹⁵ Bull. M. C. Z., Vol. LII., No. 5, October, 1908, 11 pp., 2 pls.

¹⁶ Mem. M. C. Z., Vol. XXXVII., February, 1909, 243 pp., 48 pls.

¹⁷ Mem. M. C. Z., Vol. XXXVIII., No. 1, June, 1909, 172 pp., 5 pls., 3 maps.

¹⁸ Bull. M. C. Z., Vol. LII., No. 9, June, 1909, 26 pp., 8 pls.

¹⁹ Bull. M. C. Z., Vol. LII., No. 11, August, 1909, 10 pp., 3 pls.

²⁰ Bull. M. C. Z., Vol. LII., No. 13, September, 1909, 48 pp., 4 pls.

²¹ Mem. M. C. Z., Vol. XLI., August, September, 1910, 323 pp., 56 pls.

²² Bull. M. C. Z., Vol. LIV., No. 7, August, 1911, 38 pp.



RHINOCEROS SIMUS

ANNUAL REPORT
OF
THE CURATOR
OF THE
MUSEUM OF COMPARATIVE ZOÖLOGY
AT HARVARD COLLEGE
TO THE
PRESIDENT AND FELLOWS OF HARVARD COLLEGE
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CAMBRIDGE, U. S. A.:
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MUSEUM OF COMPARATIVE ZOÖLOGY.

Faculty.

ABBOTT LAWRENCE LOWELL, *President.*
HENRY P. WALCOTT. GEORGE L. GOODALE.
SAMUEL HENSHAW, *Curator.* JOHN E. THAYER.

Committee on the Museum.

HENRY P. WALCOTT. GEORGE L. GOODALE.

Officers.

SAMUEL HENSHAW *Curator.*
WALTER FAXON *Assistant in Charge of Crustacea and Mollusca.*
SAMUEL GARMAN *Assistant in Herpetology and Ichthyology.*
WILLIAM BREWSTER *Assistant in Charge of Birds.*
W. McM. WOODWORTH *Assistant in Charge of Worms.*
OUTRAM BANGS *Assistant in Charge of Mammals.*
HUBERT L. CLARK *Assistant in Invertebrate Zoölogy.*
HENRY B. BIGELOW *Assistant in Invertebrate Zoölogy.*
ROBERT W. SAYLES *Assistant in Charge of the Geological (Exhibition) Collections.*
FRANCES M. SLACK *Librarian Emerita.*
GEORGE NELSON *Preparator.*
WALTER R. ZAPPEY *Preparator.*

WILLIAM M. DAVIS *Sturgis Hooper Professor of Geology.*
EDWARD L. MARK *Hersey Professor of Anatomy.*
GEORGE H. PARKER *Professor of Zoölogy.*
WILLIAM E. CASTLE *Professor of Zoölogy.*
WILLIAM M. WHEELER *Professor of Economic Entomology.*
ROBERT DeC. WARD *Professor of Climatology.*
HERBERT W. RAND *Assistant Professor of Zoölogy.*
JAY B. WOODWORTH *Assistant Professor of Geology.*
DOUGLAS W. JOHNSON *Assistant Professor of Physiography.*

Instructors and Assistants in the Laboratories of Zoölogy and Geology.

C. T. BRUES *Instructor in Economic Entomology.*
F. H. LAHEE *Instructor in Geology.*
JOHN DETLEFSEN *Austin Teaching Fellow in Zoölogy.*
S. I. KORNHAUSER *Austin Teaching Fellow in Zoölogy.*
R. A. SPAETH *Austin Teaching Fellow in Zoölogy.*
T. R. GOETHALS *Assistant in Zoölogy.*
A. O. GROSS *Assistant in Zoölogy.*
JONATHAN RISSER *Assistant in Zoölogy.*
P. W. WHITING *Assistant in Zoölogy.*
EDWARD WIGGLESWORTH *Assistant in Geology.*
D. C. BARTON *Assistant in Geology.*
W. P. HAYNES *Assistant in Geology.*

REPORT.

TO THE PRESIDENT AND FELLOWS OF HARVARD COLLEGE:—

Twenty courses in Zoölogy were given during the Academic year 1910–1911 by Professors Mark, Parker, Wheeler, Castle, Rand, East, and Mr. Brues to two hundred and fifty-four students in Harvard University.

Messrs. E. A. Boyden, E. C. Day, John Detlefsen, S. I. Kornhauser, Henry Laurens, C. C. Little, W. R. B. Robertson, and R. A. Spaeth served as Assistants in these courses.

The Virginia Barret Gibbs Scholarship was held by Mr. R. A. Spaeth, and the income of the Humboldt Fund aided three students, two while at work at the Bermuda Biological Station for Research and one while engaged in research at Woods Hole.

Five courses in Zoölogy were taken by thirty-five students of Radcliffe College. This instruction was given by Professors Mark and Rand and Mr. D. W. Davis. Messrs. Boyden, Kornhauser, and Spaeth were the Assistants for the Radcliffe instruction.

During the Academic year 1909–1910 the number of students and of courses was:—

Harvard, seventeen courses, two hundred and ninety-seven students; *Radcliffe*, four courses, twenty-four students.

In the Department of Geology and Geography the instruction by the regular staff was given by Professors Davis, Ward, Woodworth, Johnson, and Dr. Lahee assisted by Messrs. S. C. Lawrence, W. G. Reed, Jr., R. E. Sawyer, Sedgwick Smith, and Edward Wigglesworth. Dr. Lahee also assisted Professor Woodworth in one course.

By the courtesy of the Massachusetts Institute of Technology five students of Harvard University were admitted to courses in Palaeontology given by Prof. H. W. Shimer at the Institute.

Seventeen courses were taken by three hundred and fifteen students in Harvard University and six courses were taken by twenty-one students in Radcliffe College.

In 1909–1910 the number of courses and of students was:—*Harvard*, eighteen courses, two hundred and fifty-five students; *Radcliffe*, six courses, twenty-one students.

The income of the Josiah Dwight Whitney Scholarship Fund

aided two students in geological and geographical work in Montana, Washington, and British Columbia.

A marble tablet inscribed

In memory
of

Alexander Agassiz

1835-1910

Omnia quae hic vides monumentum

has been set in the wall of the Entrance Hall (Oxford Street) of the Museum. The tablet is the gift of Mr. Agassiz's sons, George Russell Agassiz, Maximilian Agassiz, and Rodolphe Louis Agassiz.

The Corporation has installed automatic sprinklers in the boiler rooms, preparators' rooms, work shops, and photographic rooms in the basement. The windows of a few rooms between the Museum halls and the Zoölogical laboratories have been refitted with resistant glass, and a very large proportion of the windows throughout the whole Museum have been furnished with metal weather strips. Tested to a limited extent a few years ago this appliance gave most satisfactory results, and its introduction throughout the Museum and especially in the basement during the past winter showed at once that both for cleanliness and as an economizer of fuel it will be of great and permanent usefulness. Following the policy of recent years the renovation of the work rooms and of the exhibition cases has been continued; three rooms have been renovated this year and new exhibition cases have been built for the systematic collection of mammals and for the North American faunal collections. For the research collections new cases have been built for the ornithological, herpetological, and entomological departments.

To Dr. Thomas Barbour and Mr. Louis A. Shaw the Museum's thanks are due for financial aid which has been used for improvements in the work rooms and for their better equipment.

Mr. John E. Thayer continues a most generous contributor to the collections of the Museum. His gifts to the ornithological department in many cases have anticipated its needs and have made it a most effective study collection of the birds of the world.

Through Mr. Thayer's liberality the Museum also possesses the valuable series of letters and drawings of Alexander Wilson and John J. Audubon, formerly the property of the late Joseph M. Wade. The Wilsoniana contains seventy of Wilson's original drawings of birds, a sketch of his school house, and one of the

"Sorrel Horse Inn." These drawings vary as to completeness; some are but rough outlines, while others are finished in all details and are superior both in perspective and in delicacy to the engraved plates by Alexander Lawson in the "American Ornithology." There are sixteen autograph letters of Wilson ranging in date from 1803 to 1810, two autograph poems, and his book of receipts for the engraving and coloring of the plates of his "American Ornithology."

The Auduboniana included in Mr. Thayer's gift consists of five original drawings by John J. Audubon and seventy-three of his autograph letters written chiefly to Dr. John Bachman. There are a few letters of Mrs. Audubon, one letter of her son John W. Audubon, and sixty letters of another son Victor G. Audubon.

Letters of John Bachman, J. G. Bell, T. M. Brewer, Richard Harlan, Edward Harris, Robert Jameson, George Ord, J. K. Townsend and many others are included in Mr. Thayer's gift.

Some of these letters together with extracts from the ledgers and day books kept by John J. Audubon and his sons during the publication of their works on the birds and mammals of North America will be published at some future date.

The Museum is also the fortunate possessor through the kindness of Mrs. Anna Davis Hallowell, of an Alexander Wilson memento of very great interest. This is a vertical sun-dial made by Wilson himself during the closing years of the 18th century. The dial is a simple slab of fine white marble about thirteen inches square, with

1800

Alex Wilfon

cut in; the gnomom is of iron. Mrs. Hallowell writes me that this sun-dial was given to her by her "father, Edward H. Davis of Philadelphia some time about 1870. He bought it from an old woman who had a garden on the Old York Road, near Milestown Pa., who had inherited it from her parents, and knowing my father's knowledge of birds and gardening, offered it to him. In like manner he gave it to me, and as our old house at South Yarmouth had the same date, (1800) I have kept it in our garden, until my brother, Prof. Wm. M. Davis, suggested that it would be safer with you. I therefore desire to present the dial to the Museum of Comparative Zoölogy."

From Dr. John C. Phillips the Museum has received large and valuable series of birds and mammals; among the latter especial

mention should be made of a remarkably fine skull with horns attached of a male of the typical southern race of the White Rhinoceros (*Rhinoceros simus*). This race is now practically extinct, and though Dr. Phillips's specimen lacks data, it, without doubt, came from Zululand. The front horn is massive and measures thirty-one and one half inches; it is typical in form with recurving tip, while the hind horn is quite small, only ten inches in length, and has a short compressed smooth tip. This skull is shown on the accompanying plate and has been placed on exhibition on the wall of the Divinity Avenue Entrance Hall.

Dr. Phillips, in addition to his valuable gifts to the collections, has most generously supplied the means by which an additional Preparator has been added to the Museum staff. Since August 1910, Mr. Walter R. Zappey has been engaged almost continuously upon the research collections of birds and mammals where his skill and industry are rapidly improving specimens received in the rough. He has also, in addition to several small mammals prepared for the exhibition rooms, mounted for the North American room a pair of Nelson's Sheep, *Ovis nelsoni*, collected by Dr. Phillips in Lower California.

Dr. Thomas Barbour has worked on the collections of amphibians and reptiles throughout the year; his generous expenditure of time and money has greatly enhanced the value and extent of these collections. He has also presented many valuable specimens to the collections of other departments of the Museum especially the ornithological and entomological departments.

For a handsome male Javan Peacock, *Pavo muticus*, acknowledgment is due Mr. William Barbour. This specimen mounted by Mr. Zappey is shown in the Indo-Asiatic room.

The thanks of the Museum are tendered the New York zoological society which has given, as in former years, a considerable number of reptiles; most of these have made, through Mr. Nelson's skill, admirable exhibition mounts. It was a satisfaction to the Museum to be able to offer this Society, as a slight return for similar favors in past years, a living Haytian Solenodon which had been in the Museum since 8 December, 1908; unfortunately, however, it survived in New York but a few months, and its skeleton, prepared by Mr. Nelson, is on exhibition in the systematic collection of mammals of the Museum.

For a collection of shells of great scientific value, the Museum is indebted to Mrs. F. Woodward Earl (Marie Binney Earl). Dr. Amos Binney, Mrs. Earl's grandfather, was the author of a work

on the terrestrial mollusks of the United States, which remains to-day unexcelled. The manual, "The terrestrial air-breathing mollusks of the United States and the adjacent territories of North America," of her father, William Greene Binney, was published as volumes four and five of the Bulletin of this Museum. These volumes with the several supplements issued later, maintain the reputation of Amos Binney.

Mrs. Earl's gift, the William Greene Binney collection, consists of nearly nine hundred lots of pulmonate gasteropods with the types and typical material illustrative of W. G. Binney's studies; though lacking large numbers of specimens of any form, its well-selected series shows in admirable detail the variation and distribution of the species represented.

During his studies of Palaeozoic Echini, Dr. R. T. Jackson amassed a large series of specimens of recent forms. These he has most generously presented to the Museum, and, though the Museum's series of recent Echini is an especially large and complete one, Dr. Jackson's donation contains many that are most desirable additions, including all the Mesozoic and recent forms figured in his monograph of the Echini (Memoirs Boston society of natural history, vol. 7). There are also a large number that can be used advantageously for exchanges.

In the early years of this Museum its stores were enriched by large and valuable collections gotten together by zealous missionaries in many parts of the globe. One of the notable instances of this work was that of the Rev. M. M. Carleton. Mr. Carleton's collections, received during the early seventies, were made almost entirely about Amballa and Koolloo, India, and their value is increasingly recognized each year.

It is especially gratifying to record a similar service this year. To the Rev. George Schwarb the Museum is much indebted for many and most desirable additions to its series of reptiles and amphibians. Collected in western equatorial Africa, Mr. Schwarb's specimens add a number of species previously unrepresented in the Museum collections, and they are, moreover, in excellent condition for study.

In the name of the late Francis A. Pierce, Mrs. Pierce has most kindly given the Museum a collection of skulls and horns of ungulates, some of which have been mounted by Mr. Nelson and are shown on the wall of the Divinity Avenue Entrance Hall.

The Museum is indebted to Mr. L. J. de G. de Milhau for another installment of Icelandic birds. These as well as previous

sendings have been prepared by Rowland Ward and are presented as the joint gift of Mr. de Milhau and the late Mr. J. W. Hastings.

The Museum is also indebted to Miss H. E. Hooker, and to Messrs. E. N. Fischer, Henry Hales, and William McNeil for specimens for its collection of domestic fowls, to Col. John Caswell for a skin and skeleton of the rare African Nandi Maned Rat, *Lophiomys testudo*, to Mr. R. A. Spaeth for a series of copepods, to Prof. W. M. Wheeler for some desirable arachnids and myriopods from the western United States, and to the American museum of natural history for the skin and skeleton of the West Indian Seal, *Monachus tropicalis*. Prof. J. B. Woodworth and Mr. R. W. Sayles have presented fossils of value, and acknowledgment is also due Mr. W. T. Davis and the Hon. Mason Mitchell for specimens sent to the Museum.

Thanks to the kind interest of Mr. J. H. Emerton and Miss E. B. Bryant the collection of Araneida is in excellent condition; by their work and their gifts the value of the collection is greatly enhanced.

The Museum is indebted to Prof. S. F. Clarke for the identification of a series of hydroids loaned him for study several years ago. Prof. A. E. Verrill has studied at the Museum such of the alcyonarian corals as relate to his report on the species collected by the U. S. C. S. S. "Blake." For this report ninety-eight plates have been delivered and the text and remaining plates are well advanced.

The ornithological collections have profited greatly by the zealous work of Mr. Bangs. The addition of a large case for the research collection of skins has enabled him to arrange the passerine families, Fringillidae to Streperidae inclusive, in the order of Sharpe's Hand-list; this work necessitated the reidentification of many skins and also took considerable time for labeling and cataloguing. In addition to the above, Mr. Bangs has kept the ordinary current work of the ornithological department well in hand.

Mr. Robert W. Sayles who has had charge of the exhibition collections in the Geological Section of the Museum since December, 1906, is rapidly making the rooms devoted to these collections instructive to students and attractive to the general visitor. Attention may be called to a model illustrative of earthquake action and to one of a Japanese earthquake-proof house, that have been installed this year.

Dr. G. M. Allen has continued his work on the collection of mammals; he has finished the revision of the Muridae, Spalacidae,

and Geomyidae and also the alcoholic specimens of monotremes, marsupials, and primates. Dr. Allen spent five weeks in Grenada collecting in the interests of the Museum and, as in previous years, he has devoted a portion of his time to research. One of the results, Mammals of the West Indies, was issued as Bulletin M. C. Z., vol. 54, no. 6, p. 175-263; another, an account of the species of Proechidna, is practically complete.

Mr. W. F. Clapp was employed for a few months on the Molluscan collections. Under Dr. Faxon's direction and with the voluntary aid of Mrs. N. A. Clapp, a large amount of routine work was accomplished. Mr. Clapp also collected for the Museum large series of shells in New England and in Florida. The Museum is very much indebted to Mrs. Clapp for her earnest work throughout the year.

Mr. Nelson's work has, as usual, been varied in scope; it includes the remounting and repair of a considerable number of skeletons of reptiles, birds, and mammals, a work long needed and one which has improved the appearance of the exhibition cases. He has made and mounted some skeletons not previously shown in the exhibition series, has continued his successful work of mounting reptiles for exhibition and has also mounted a series of finches for the West Indian faunal collection. As in previous years his handiwork, both photographic and mechanical, is serviceable throughout the Museum.

The Museum is again under obligations to Messrs. Faxon, Brewster, Woodworth, Bangs, Bigelow, and Sayles for their interest in their respective departments.

The accompanying reports of the Assistants give the usual details as to the additions received and the work accomplished during the year.

To the exhibition collections have been added a number of fishes mounted by Mr. S. F. Denton. Mr. Denton has also mounted several specimens of Salmon, *Salmo salar*, which Dr. John Collins Warren was good enough to send from Quebec for this purpose. A few North American mammals obtained through the kind coöperation of Mr. H. E. Redmund have been mounted by Mr. Nelson and an especially handsome specimen of the European Bison, *Bos bonasus*, purchased of Rowland Ward, fills a place too long vacant in the systematic collection. The Museum has also obtained by purchase a skin with skeleton of Père David's Milou Deer, *Elaphurus davidianus*, a very rare species found only in northern China and closely related to North American forms.

For its research collections the Museum has acquired some selachians of unusual interest; fragments of fossil fishes from the Lower Old Red Sandstone of Scotland; fossil vertebrates from the Cretaceous of western Kansas; and additional series of Rotifera.

Drs. Clark and Bigelow collected for two weeks in August, 1910, at Grand Manan, and the same length of time was spent at the same place in July, 1911, by Dr. Clark. Though the results of the dredging and of the surface collecting were rather meagre, some interesting forms were obtained by shore work. Dr. Clark also made quite an advance toward a satisfactory preparation of starfishes. During the past summer Dr. Bigelow devised and tested satisfactorily a closing net for horizontal towing. This work was carried on in Massachusetts Bay and in the Gulf of Maine, and for the opportunity to undertake it as well as the expedition to Grand Manan in 1910, acknowledgment is due Mr. Joseph S. Bigelow, Jr., who most kindly placed his yacht at the disposal of Drs. Bigelow and Clark.

Dr. G. M. Allen and Mr. C. T. Brues collected, during their stay of five weeks in Grenada, B. W. I., many desirable mammals, birds, and reptiles, together with some invertebrates of exceptional interest. The generosity of Dr. Thomas Barbour enabled Messrs. Allen and Brues to undertake this work for the Museum.

The Library contains 48,019 volumes, and 44,442 pamphlets; the accessions for the year are 1,095 volumes, and 1,075 pamphlets.

An Audubon plate of peculiar interest, a gift of Mr. John E. Thayer, has been hung in the Library; it represents *three* Clapper Rails in place of *two* shown in Audubon's published works; both the arrangement of the birds and the background differ from the Havell plate. The plate given by Mr. Thayer was printed by Childs and Inman, Philadelphia, and is dated 1832; the date of the Havell plate is 1834.

There have been placed in the Library two noteworthy records of Mr. Agassiz; one the original manuscript from which the abstract of his first scientific paper on the mechanism of the flight of Lepidoptera, Proceedings Boston society of natural history, February, 1859, was made, and the other a case with a number of beautiful drawings on wood, the work of Mr. Agassiz during the early years of the Museum; these figures were drawn for a textbook of zoölogy, proposed, but never carried to completion, by his father. The manuscript is the property of Mrs. George R. Agassiz and has been kindly loaned by her.

The publications of the year are listed on pages 38-39; these

include one volume and four numbers of the Memoirs, eight numbers of the Bulletin and the Annual Report, a total of 975 (681 quarto, 294 octavo) pages and 138 (110 quarto, 28 octavo) plates.

The volume and two numbers of the Memoirs contain reports on the scientific results of expeditions carried on under Mr. Agassiz's direction. Mr. Springer's Memoir is a continuation of his studies of fossil crinoids, some of which have been published in earlier volumes of the Memoirs. The other Memoir and six numbers of the Bulletin represent work of the Museum staff or reports on collections of the Museum; one number of the Bulletin is a Contribution from the Zoölogical Laboratory and one number contains Sir John Murray's address on Mr. Agassiz's life and scientific work.

To assist in the publication of Contributions from the Zoölogical and Geological Laboratories the Corporation has continued the usual appropriation of \$350.

For the publication of the Reports on the expeditions of the "Blake" and "Albatross" and for some other Memoirs in which he was interested Mr. Agassiz made provision by his will. Of the Blake reports that of Dr. Hartlaub on the Comatulæ is in type and will be published during the coming year. Mention has been made of the progress of Professor Verrill's work on the alcyonarians and it is hoped that this also will be issued before the close of the Museum year 1911-1912. With these extensive reports published there is, with the exception of the Crustacea now in the hands of Professor Bouvier, but little "Blake" material still unworked. For the three expeditions of the "Albatross," those of 1891, 1899-1900, and 1904-1905, the reports of Dr. Hansen on the schizopods, Dr. Bigelow on the siphonophores, and that of Messrs. Kendall and Radcliffe on the shore fishes of the expedition of 1904-1905, will be issued during the year. Mr. Garman's monograph of the plagiostomes will also be published at an early date. Several other reports on the collections of the "Albatross" are in a forward state of preparation.

SAMUEL HENSHAW.

REPORT ON THE ZOÖLOGICAL LABORATORY.

BY E. L. MARK.

Aside from the changes due to the regular alternation of certain courses, the courses of instruction in Zoölogy during 1910-11 were substantially the same as in 1909-1910, with one exception — the addition of Zoölogy 7*d*, Forest Entomology. Merely formal changes were, the substitution of "Practical Entomology" for "Common Economic Insects and Methods of controlling them" as a description of Zoölogy 7*c*, and the designation by new members of two of the fields of research previously offered: "20*b*, Cytology, with special Reference to Heredity," and "20*g*, Experimental Morphology."

As usual, the following tables show the number of students in each of the several classes who attended each of the courses in Zoölogy. The first table exhibits the facts for Harvard University, the second for Radcliffe College.

TABLE I.

Courses 1910-11	Graduate		Sen.	Jun.	Soph.	Fresh.	Spec.	Uncl.	Total
	A. & S.	Ap. Sci.							
Zoölogy 1	3		10	8	30	68	4	6	129
" 2	1			7	8	7		1	24
" 3	3		3	5	3	1			15
" 4	1		1	1	1	1			5
" 5 <i>a</i>			1	1	1				3
" 7 <i>a</i>	4	2	1	2		1			10
" 7 <i>b</i>	2	2	1	2		1			8
" 7 <i>c</i>		2	2						4
" 7 <i>d</i>		9							9
" 11		2	3	2	3				10
" 12	3								3
" 14 <i>b</i>	7	3		2					12
" 17	2	1							3
" 20 <i>a</i>	2								2
" 20 <i>b</i>	3								3
" 20 <i>c</i>	5								5
" 20 <i>d</i>	2	1							3
" 20 <i>e</i>	1		1						2
" 20 <i>f</i>		3							3
" 20 <i>g</i>	1								1
Sums	40	25	23	30	46	79	4	7	254

TABLE II.

Courses 1910-11	Gr.	Sen.	Jun.	Soph.	Fresh.	Spec.	Total
Zoölogy 1		3	8	2	8	3	24
“ 2		1	3		1	1	6
“ 3	1		1	1			3
“ 4	1						1
“ 5a	1						1
Sums	3	4	12	3	9	4	35

Professor Parker had, for a second time, as chief assistant in Zoölogy 1, Mr. E. C. Day, Austin Teaching Fellow; as sub-assistants he had Messrs. H. Laurens, W. R. B. Robertson, and R. A. Spaeth.

Professor Castle likewise had as laboratory assistant in Zoölogy 2 the assistant of the previous year, Mr. John Detlefsen, Austin Teaching Fellow.

Zoölogy 1 and Zoölogy 2 in Radcliffe College were conducted — both lectures and laboratory exercises — by Mr. D. W. Davis, as in the preceding year.

Zoölogy 3 was given, as usual, by Assistant Professor Rand, who had as his assistant in the Harvard class Mr. H. Laurens, in the Radcliffe class, Mr. R. A. Spaeth. Several graduate students in Harvard attended the lectures in this course without being enrolled, and one did a considerable portion of the laboratory work without seeking credit for it.

In Zoölogy 4, both in Harvard and in Radcliffe, Assistant Professor Rand had as assistant Mr. E. A. Boyden.

The laboratory work in Zoölogy 5a, in both Harvard and Radcliffe, was in charge of Mr. S. I. Kornhauser with general supervision by Assistant Professor Rand. The lectures were given by Professor Mark.

The lectures in the courses in Entomology were given for the most part in Cambridge, the laboratory work at the Bussey Institution. Zoölogy 7a and 7b were given by Professor Wheeler, assisted by Mr. Brues, and Courses 7c and 7d were given by Mr. Brues. The number of students pursuing entomology was more than twice that of the preceding year.

The title of the course formerly announced as “Zoölogy 11” has been changed to “Zoölogy and Botany 11,” in conformity with the nature of the instruction given, and was conducted, as in

the preceding year, by Professor Castle and Assistant Professor East. On the zoölogical side the laboratory work was conducted partly at the Bussey Institution and partly at the Museum of Comparative Zoölogy. Mr. C. C. Little assisted in the course.

Zoölogy 12 was given by Professor Mark, whose assistant in the laboratory work was Mr. S. I. Kornhauser.

In Zoölogy 14*b*, by Professor Parker, four students substituted theses for the laboratory work. Of those who chose laboratory work, two had the same topics as in Zoölogy 20*c*. The results reached by two others will be prepared for publication. Two students not enrolled attended the lectures.

The laboratory work of Assistant Professor Rand's course Zoölogy 17 consisted in regeneration and grafting experiments on *Hydra*. The lectures were attended by two graduates who were not enrolled.

Nineteen students (fourteen registered in the Graduate School of Arts and Sciences, four in the Graduate School of Applied Science, and one Senior) carried on researches, five each under Professors Mark and Parker, and three each under Professors Wheeler, Castle, and Rand.

Of these, four met the requirements for, and received in June, the doctor's degree, three — Messrs. Barbour, Day and Laurens — receiving the degree Ph.D., and one — Mr. Titus — the degree S. D. The thesis of Thomas Barbour was entitled "*A contribution to the zoögeography of the East Indian Islands*," that of Edward C. Day, "*The effect of colored light on pigment migration in the eye of the crayfish*," that of Henry Laurens, "*The reactions of amphibians to monochromatic lights of equal intensity*," and that of Edward G. Titus, "*Monograph of the genera *Phytonomus* and *Hypera**." Mr. Samuel C. Palmer completed the requirements for the degree Ph. D., but too late for recommendation in June. His thesis is entitled "*The numerical relations of the histological elements in the vertebrate retina*." The thesis of Mr. J. W. Chapman, on "*Insects injurious to the trees in the college yard*," was accepted and will be published soon. Satisfactory work was accomplished by the other research students.

Two students received aid from the income of the Humboldt Fund to the amount of \$138.57 while working at the Bermuda Biological Station, and one while working at Woods Hole received from the same source \$58.00.

The Bermuda Biological Station was opened June 26, and closed August 5. Of the four persons enrolled, three were connected with

Harvard University. Three numbers of the Contributions from the Station have been published during the year.

During the April recess Professor Mark delivered a lecture at Colgate University on "Some vestigial organs in man."

Professor Parker spent much time during the year in perfecting an appliance for the production of spectral light of measured intensity. He also wrote for "*Folia neurobiologica*" reviews of the American papers on the physiology of the nervous system.

Professor Wheeler's assistant, Mr. W. Reiff, devoted one half his time to a continuation of the study of the wilt disease of the Gypsy moth, in coöperation with the State Forester, the other half being given to work on the Bussey collection of insects.

During November and December Professor Castle delivered a course of eight lectures at the Lowell Institute in Boston on "Heredity in relation to evolution and animal breeding." The lectures are to be published. In February, 1911, he delivered a lecture on "The nature of unit characters," before the Harvey Society of New York, and in July, 1911, at the University of Chicago, two lectures, on "The method of evolution," and on "Heredity and sex." These three lectures are also to be published. Professor Castle has had in his research work the coöperation of Research Fellow, Dr. J. C. Phillips.

Mr. Brues has devoted some time to the preparation of a poster for the Women's Municipal League illustrating the activities of the housefly.

The Zoölogical Club held twenty-three meetings; twenty original papers and seven reviews were presented. The average attendance was between fourteen and fifteen.

PUBLICATIONS. AUGUST 1, 1910—JULY 31, 1911.

Contributions from the Zoölogical Laboratory.

209. PARKER, G. H.—Olfactory reactions in fishes. *Journ. exp. zoöl.*, August, 1910, vol. 8, p. 535-542.
210. BANTA, A. M.—A comparison of the reactions of a species of surface isopod with those of a subterranean species.—Part II. *Journ. exp. zoöl.*, August, 1910, vol. 8, p. 439-488.
211. HURWITZ, S. H.—The reactions of earthworms to acids. *Proc. Amer. acad. arts and sci.*, September, 1910, vol. 46, p. 65-81.
212. COLE, L. W.—Reactions of frogs to chlorides of ammonium

- potassium, sodium, and lithium. *Journ. comp. neurol. and psychol.*, December, 1910, vol. 20, p. 601-614.
213. MORGULIS, S.—The movements of the earthworm: a study of a neglected factor. *Journ. comp. neurol. and psychol.*, December, 1910, vol. 20, p. 615-624.
 214. PARKER, G. H.—The olfactory reactions of the common killifish, *Fundulus heteroclitus* (Linn.). *Journ. exp. zool.*, January, 1911, vol. 10, p. 1-5.
 215. MORGULIS, S.—Contributions to the physiology of regeneration. III. Further experiments on *Podarke obscura*. *Journ. exp. zool.*, January, 1911, vol. 10, p. 7-22.
 216. LONG, J. A., and MARK, E. L.—The maturation of the egg of the mouse. *Publ. Carnegie inst. Washington*, April, 1911, No. 142, iv + 72 pp., 7 pls.
 217. HERMS, W. B.—The photic reactions of sarcophagid flies, especially *Lucilia caesar* Linn. and *Calliphora vomitoria* Linn. *Journ. exp. zool.*, February, 1911, vol. 10, p. 167-226.
 218. BUCKINGHAM, E. N.—Division of labor among ants. *Proc. Amer. acad. arts and sci.*, March, 1911, vol. 46, p. 423-508, 1 pl.
 219. MORGULIS, S.—Contributions to the physiology of regeneration. IV. Regulation of the water content in regeneration. *Journ. exp. zool.*, April, 1911, vol. 10, p. 321-348.
 220. MORGULIS, S.—Contributions to the physiology of regeneration. V. Regeneration of isolated segments and of small pieces of worms. *Amer. journ. physiol.*, March, 1911, vol. 27, p. 415-426.
 221. PARKER, G. H.—The mechanism of locomotion in gastropods. *Journ. morph.*, March, 1911, vol. 22, p. 155-170.
 222. MORGULIS, S.—Studies of inanition in its bearing upon the problem of growth. I. *Arch. f. entwicklungsmechanik*, May, 1911, bd. 32, p. 169-268, pl. 8-10.
 223. LAURENS, H.—The reactions of amphibians to monochromatic lights of equal intensity. *Bull. M. C. Z.*, June, 1911, vol. 53, p. 251-302.

Contributions from the Bermuda Biological Station for Research.

20. CARPENTER, F. W.—Feeding reactions of the rose coral (*Iso-phyllia*). *Proc. Amer. acad. arts and sci.*, October, 1910, vol. 46, p. 147-162, 1 pl.

21. ESTERLY, C. O.—Calanoid Copepoda from the Bermuda islands. *Proc. Amer. acad. arts and sci.*, July, 1911, vol. 47, p. 217–226, 4 pls.
22. COWDRY, E. V.—The colour changes of *Octopus vulgaris* Linn. *Univ. Toronto studies, Biol. ser.*, July, 1911, no. 10, 53 pp., 4 pls.

*Contributions from the Entomological Laboratory of the Bussey
Institution.*

Professor Wheeler reports that fourteen entomological articles have been completed and in great part published by members of the staff and by students during the academic year.

Other Publications.

- CASTLE, W. E.—On sex-chromosomes in hermaphroditism. *Amer. nat.*, July, 1911, vol. 45, p. 425–430.
- Double-mating of silk-worm moths. *Science*, 7 July, 1911, new ser., vol. 34, p. 15–21.
- On “soma influence” in ovarian transplantation. *Science*, 28 July, 1911, new ser., vol. 34, p. 113–115.
- CASTLE, W. E., and LITTLE, C. C.—On a modified Mendelian ratio among yellow mice. *Science*, 16 December, 1910, new ser., vol. 32, p. 868–870.
- CASTLE, W. E., and PHILLIPS, J. C.—On germinal transplantation in vertebrates. *Publ. Carnegie inst. Washington*, March, 1911, No. 144, 26 pp., 2 pls.
- LITTLE, C. C.—The “dilute” forms of yellow mice. *Science*, 9 June, 1911, new ser., vol. 33, p. 896–897.
- PARKER, G. H.—Influence of the eyes, ears, and other allied sense organs on the movements of the dog fish, *Mustelus canis* (Mitchill). *Bull. bureau fisheries*, November, 1910, vol. 29, p. 43–57.
- The olfactory sense of fishes. *Amer. journ. physiol.*, February, 1911, vol. 27, p. xix.
- The origin and significance of the primitive nervous system. *Proc. Amer. philos. soc.*, May–June, 1911, vol. 50, p. 218–225.

REPORT OF THE STURGIS HOOPER PROFESSOR OF GEOLOGY.

BY WILLIAM E. DAVIS.

My teaching has been limited to the advanced course of research in Physiography (Geol. 20a), which was attended by seven students. The problems discussed were:—the physiographic treatment of faults, the physiography of Washington and of Wales, experiments in different methods of physiographic description, and the physiography of three districts in western Canada; the latter subjects were treated by three junior members of the Geological survey of Canada, who attended the course during the second half-year, and who presented their reports on field work of the previous summer as a basis for discussion in the class.

My personal work for the first half-year was chiefly devoted to the completion of the manuscript and drawings for my Berlin lectures of 1908–1909, now in process of publication under the title:—“Die Erklärende Beschreibung der Landformen.” A small share of time was given to revision of a German translation of my “Physical Geography” by Dr. G. Braun, of the University of Berlin. During the latter part of the winter, about two months were given to the writing and illustration of an account of a visit to the Rocky mountains of Colorado in the summer of 1910. This article gives special attention to method of treatment as well as to the subject treated. During the spring a beginning was made on a long-postponed task; the writing of a book on the “Forms of the Lands” for students of university grade. Further progress on this undertaking has been interrupted by the preparatory work incident to my appointment as visiting professor to the University of Paris for next winter.

An active correspondence has been carried on during the late winter and spring in the preparation of two geographical excursions; the first, a “Geographical pilgrimage to Rome,” has been planned in connection with Dr. F. Nussbaum of Bern. This will begin in Ireland and will reach Italy in early October, in time to take part in the International Geographical Congress at Rome. The second excursion, named the “Transcontinental Excursion of

1912," has been placed under my direction by the American geographical society of New York. Its object is the celebration of the sixtieth anniversary of the foundation of the Society and the completion and occupancy of its new buildings, by an international excursion across the United States during six or seven weeks in August, September, and October, 1912.

During the course of the year, visits have been made to St. Louis, on occasion of the November meeting of the National academy of sciences; to the University of Illinois, for the purpose of giving a brief course of lectures on Geography as a University subject; to Pittsburgh, to attend the meetings of the Geological society of America and of the Association of American geographers; to the University of Wisconsin to deliver a brief course of lectures; twice to Washington, to consult with certain members of the United States geological survey and address the Geological society of Washington on "Geographical descriptions in geological publications," again to attend the annual meeting of the National academy of sciences; and finally to Philadelphia to take part in the general meeting of the American philosophical society.

PUBLICATIONS. AUGUST 1, 1910-JULY 31, 1911.

Notes on the description of land forms. *Bull. Amer. geogr. soc.*, 1910, vol. 42: September, p. 671-675; November, p. 840-844. 1911, vol. 43: January, p. 46-51; March, p. 190-194.

America. I. Physical geography. *Encyclopaedia Britannica*, 1910, ed. 11, vol. 1, p. 805-806.

The disciplinary value of geography. *Pop. sci. monthly*, 1911, vol. 78: February, p. 105-119; March, p. 223-240.

Rational study of topographic forms. A review. [Berthaut's *Topologie: Etude du terrain*"]. *Bull. Amer. geogr. soc.*, May, 1911, vol. 43, p. 361-364.

Short studies abroad: The seven hills of Rome. *Journ. geogr.*, 1911, vol. 9, p. 197-202, 230-233.

Geography: Introduction and physical geography of the lands. *American year book*, 1911, p. 579-581.

North America. *Encyclopaedia Britannica*, 1911, ed. 11, vol. 19, p. 760-765.

United States * * * I. Physical geography. *Encyclopaedia Britannica*, 1911, ed. 11, vol. 27, p. 612-624.

[United States] III. Climate. *Encyclopaedia Britannica*, 1911, ed. 11, vol. 27, p. 632-633.

REPORT OF THE DEPARTMENT OF GEOLOGY AND GEOGRAPHY.

BY ROBERT DEC. WARD.

Instruction in the Department has been greatly weakened by the continued omission of all courses in Palaeontology. Arrangements were made with the Massachusetts Institute of Technology whereby five of our students were admitted to the regular courses in Palaeontology given by Prof. H. W. Shimer. As a temporary arrangement this plan served its purpose satisfactorily, but it was obviously inconvenient and time-consuming for the students. This Department is under obligations to the authorities of the Institute of Technology and to Professor Shimer for their courtesy in connection with this undertaking.

The seventeen courses and half-courses in Geology and Geography were elected by 315 students in Harvard University, as against 255 in the previous year, and the six courses offered in Radcliffe College were taken by 21 students, the same number as in 1909-1910. Messrs. F. H. Lahee, S. C. Lawrence, W. G. Reed, Sedgwick Smith, and Edward Wigglesworth were Assistants during the year.

The Gardner Collection of photographs and lantern slides is becoming increasingly useful every year. Mr. Edward Wigglesworth, the Curator, has rendered valuable service in putting it in order for the most effective use. The state of the Collection on July 1, 1911, is shown in the subjoined table: —

State of Collection, July 1.	Photographs.	Slides.	Negatives.
Accessions since last report	147	441	3
Unidentified views	150	0	155
Duplicates	116	0	0
Broken	0	0	0
Condemned	0	0	0
Last accession number	6469	6664	0
Number now in collection	6358	6752 ¹	839
Card catalogued	0	6752	0

¹ Includes 88 meteorological slides numbered in advance.

The Josiah Dwight Whitney Scholarships were awarded as follows: \$100. to Ransom E. Somers, 2 G.; \$100. to Winthrop P. Haynes, '11, and the excess of income over \$200. to Winthrop P. Haynes for geographical study in the State of Washington on problems outlined by Professor Davis.

The Summer School in the Rocky Mountains of Montana, conducted by Professor Woodworth, was very successful. The establishment of this course upon a permanent basis, owing to the generous gift of \$10,000. from Mr. Robert W. Sayles, will without doubt greatly strengthen this Department, and will also widen its sphere of influence in the country at large.

No student took the research course in Meteorology (Geology 20f) offered by Professor Rotch, and his time was occupied in directing the work of the Blue Hill Observatory.

In Meteorology and Climatology, Professor Ward notes the addition, to the teaching equipment, of the following:— a set of the new Oxford Wall Maps; three enlarged world maps of mean maximum and mean minimum temperatures and of mean annual extreme ranges of temperature (after van Bebbber); a set of greatly enlarged weather maps illustrating typical weather conditions, these large wall maps being necessitated by the increase in the number of students in the elementary course in Meteorology; and about fifty photographic enlargements of South American subjects for use in the course on the Geography of South America ("Geology 2"). The danger in connection with the use of the roof-platform by students, especially during the winter months, has led to the removal of the thermometer shelter from the roof. The thermometer, thermograph, and hygrograph are now placed in a window shelter on the 4th floor, in a more convenient and accessible location, where they can be readily seen at all times. The mercurial barometers and the barograph are placed in the same room, and are also easily accessible. The roof-platform will be used for the rain-gauges, for nephoscope work, and for the purpose of making comparative readings of instruments at different heights. A new Negretti and Zambra *hyetograph* has been added to the instrumental equipment. A new set of cloud charts for the United States, prepared by Kenneth McR. Clark as a part of his work in the course in Advanced Climatology has been published (Quart. Journ. roy. met. soc., April, 1911, vol. 37, p. 169–175).

Assistant Professor J. B. Woodworth reports that he gave the lectures in Geology 4, 5, 8, and 16, with the assistance, in the

laboratory and field, of Messrs. S. C. Lawrence and Edward Wigglesworth in Course 4, Dr. F. H. Lahee in Course 5, and Mr. Sedgwick Smith in Course 8. Mr. R. E. Sawyer acted as extra assistant in Geology 4. In Radcliffe College Professor Woodworth gave courses 4, 5, 8, and 20c, the latter course being given by special request.

The teaching collections in the geological laboratory were augmented during the year by suites needed to fill out gaps in the historical series. Mr. G. M. Flint collected rocks and fossils from the Cretaceous and Carboniferous in New Jersey and Pennsylvania during the April recess. Professor Woodworth conducted an excursion to the Gay Head cliffs. Professor Woodworth devoted considerable time to the preparation of his report on the Shaler Memorial Expedition to Brazil and Chile, and to the work of the Seismographic Station.

On July 1st Professor Woodworth, accompanied by Mr. Edward Wigglesworth as Assistant in Geology, proceeded to Bozeman, Montana, from which point was conducted the Rocky Mountain Summer Course in geology for five weeks, with an attendance of eight students. The route traversed covered the geology of the Madison cañon near Norris, the Madison terraces, Old Baldy Mt. at the head of Alder Gulch, the placer workings below Virginia City, and the geological structure of the Sphinx Mt. region in the Madison range. Mr. Sedgwick Smith spent ten weeks in field work on the structure of the region between the Madison and Ruby ranges, and Mr. R. E. Somers spent five weeks on the basalts and structure of Alder Gulch. Both were enrolled in Course S20c.

A report on the surface geology of the Portland quadrangle, Me., prepared by Mr. Ralph E. Sawyer, is ready for publication.

Professor Woodworth, at the close of the Summer School, inspected the seismological station at the University of California, and went thence via Los Angeles to the Grand Cañon of the Colorado and so to Oklahoma, where an examination was made of the reported occurrence of glacial erratics in the Carboniferous Caney shales, from which a collection of the striated stones was made. The striations were found to be caused by interstitial rock motion.

Assistant Professor Johnson gave courses A, 6, 10, and, in co-operation with Professor Davis, Course 20a. In the Summer School he offered a course in physiographic field work in connection with the Shaler Memorial Investigation; this was elected by three students who also acted as Assistants in the investigation; in the

University Extension course in Geography Professor Johnson delivered fifteen lectures on the Geography of Europe to a class of nearly one hundred teachers.

By vote of the Division, Professor Johnson was appointed to have charge of the Second Shaler Memorial Investigation of shoreline changes along the Atlantic coast. During the winter much time was spent in preparation for this investigation, and field work was commenced on the east coast of Florida in the April recess. During the spring and summer studies were made at numerous localities from Long Key to the coast of Maine, and in the Maritime Provinces of Canada; while six weeks were devoted to studies on the Baltic coast of Sweden, the eastern coast of England, and the coast of Holland. Messrs. D. C. Barton, J. K. Wright, and G. B. Reed rendered effective service as Assistants, and the party profited greatly by the personal co-operation of many American and European geologists and engineers. The scope of the investigation was broadened by extensive co-operation of the Geological Survey of New Jersey and the United States Bureau of Mines.

Geol. 12 and Mining 28, courses in advanced field geology, were given by Dr. F. H. Lahee. Members of course 12 were required, as hitherto, to report upon investigations undertaken individually. For Mining 28 a new plan was adopted. October was devoted to class work in the field, whereas, during the remaining part of the term, each student, individually, surveyed an area which had been chosen for its value in exhibiting a wide range of geological phenomena. This method was found to be very successful.

Dr. Lahee completed his research on the geology of southern Rhode Island, and presented his results, for the Doctorate of Philosophy, in a thesis entitled, "A Study of Metamorphism in the Carboniferous Formation of the Narragansett Basin." He spent his summer in field work in northern New Hampshire.

PUBLICATIONS. AUGUST 1, 1910-JULY 31, 1911.

JOHNSON, D. W.

The supposed recent subsidence of the Massachusetts and New Jersey coasts. *Science*, 18 November, 1910, new ser., vol. 32, p. 721-723.

Beach cusps. *Bull. geol. soc. Amer.*, 24 November, 1910, vol. 21, p. 599-624, pl. 41-42.

- Botanical evidence of coastal subsidence. *Science*, 24 February, 1911, new ser., vol. 33, p. 300-302.
- Practical exercises in map drawing. Boston, J. L. Hammett & Co., 1911.
- ROTCH, A. L.
 The atmospheric ocean. *Sci. Amer.*, 22 October, 1910.
 Observations and investigations made at the Blue Hill Observatory in the years 1906, 1907, and 1908. (Editor). *Ann. Harv. coll. observ.*, 1911, vol. 68, pt. 2.
- ROTCH, A. L. AND PALMER, A. H.
 Charts of the atmosphere for aeronauts and aviators. New York, Wiley & Sons, 1911.
- WARD, R. DEC.
 Climate and climatology. *Encyclopaedia Britannica*, ed. 11, 1910, vol. 6, p. 509-526.
 The country of seven hundred million coffee trees. *Dallas (Texas) news*, 15 January, 1911.
 The economic climatology of the coffee district of São Paulo, Brazil. *Bull. Amer. geogr. soc.*, June, 1911, vol. 43, p. 428-445.
 Meteorology. *American year book*, 1911, p. 575-577.
 Notes on climatology and reviews. *Bull. Amer. geogr. soc.*, throughout the year.
- WOODWORTH, J. B.
 Geology — Dynamical and structural. *American year book*, 1911.
 Sulla propagazione dei movimenti prodotti dal terremoto di Messina del 28 Dicémbre, 1908, by G. B. Rizzo. A review. *Bull. Seismol. soc. Amer.*, 1911, vol. 1, p. 86-88.
 The nomenclature of seismological reports. *Amer. seismol. journ.*, 1911, vol. 1.

APPENDIX.

THE HARVARD SEISMOGRAPHIC STATION.

BY J. B. WOODWORTH.

Eighty-three earthquakes or seismic disturbances recorded by the Bosch-Omori tromometer during the academic year ending July 31st, 1911, G. M. T., civil reckoning, have been deciphered. These records will in the future form an annual Bulletin in the Geological series of the Museum.

But one recognized local shock was recorded during the year, that of Feb. 6th, 1911, at 6h. 36m. 17s. A. M., Eastern standard time. This shock was felt by the observer. None of the local shocks reported by the daily press at points along the coast of Maine or in the Merrimac valley were registered.

From the beginning of the year 1911, the records of the Station have been issued to several exchanges in the form of a mimeographed monthly bulletin. The following stations and observatories now regularly send reports to the Geological Museum:—

The International Seismological Bureau, Strassburg, Germany. The Astronomical Observatory, Ottawa, Canada. St. Ignatius College Observatory, Cleveland, O., J. S. S. Canisius College, Buffalo, N. Y., J. S. S. Spring Hill College, Mobile, Ala., J. S. S. Santa Clara College Observatory, Santa Clara, Calif., J. S. S. St. Louis University Observatory, St. Louis, Mo., J. S. S. Loyola College Observatory, New Orleans, La., J. S. S. N. Y. State Museum, Albany, N. Y. University of Washington, Seattle, Washington.

The Strassburg International Bureau also transmits its "*Monatliche Uebersicht über die Seismische Tätigkeit der Erdrinde.*"

The Station clock has throughout the year been compared almost daily with the chronograph of the Harvard Astronomical Observatory by means of the telephone. Mr. G. M. Flint has performed the routine work of the instrument room except during a few days in April, and from Aug. 1st to Aug. 25th, 1911. In August the routine duties including the care of the Station clock were discharged by Mr. Sidney Holmes, janitor.

The pendulums have been allowed to swing without damping as heretofore owing to the difficulty in securing a sufficiently delicate adjustment of the air damping devices. This is a serious defect in arriving at an accurate measurement of the motion of the ground during the passage of seismic waves. A comparison of the times of beginning of the first preliminary waves at this Station with similar data obtained by frictionless photographic registration at Ottawa makes it clear that the mechanical registration here employed retards the initial swinging of the pendulums. It is also probable that the initial seismic energy is somewhat dissipated in its passage through the deep superficial deposits upon which the pier rests. Belated readings amounting to as much as 30 secs. in the case of certain records seem to be attributable to one or both of these now unavoidable causes. I wish also to call attention to the recommendation of the International Seismo-

logical Commission that a seismographic station should be equipped with at least two seismographs of modern types and these of different designs. To carry out this recommendation would require the services of a specialist whose time if necessary could be devoted wholly to the working up of the large amount of seismological data which such an equipment would afford. The work of the present station requires more time than the Assistant Professor of Geology should take from his geological investigations.

REPORT OF THE MAMMALS.

BY OUTRAM BANGS.

The mammal collection has received about 200 additional specimens, a nice series of skins and skulls from the Cameroons, received from Dr. Thomas Barbour and a collection made in Grenada, West Indies by Dr. Glover M. Allen, being the principal acquisitions.

Single specimens and small series have been presented by Messrs. G. M. Allen, Thomas Barbour, E. H. Baynes, W. S. Brooks, John Caswell, Allen Cleghorn, R. S. Hardy, L. C. Jones, George Nelson, J. C. Phillips, C. I. Ramsden, J. C. Tello, J. E. Thayer, C. G. Willoughby, and W. R. Zappey.

A fine West Indian seal was presented by the American museum of natural history, and a skin and skeleton of Père David's deer was purchased.

An exchange was made with the Field museum of natural history.

PUBLICATIONS. AUGUST 1, 1910-JULY 31, 1911.

Two new woodpeckers from the Isle of Pines, West Indies. *Proc.*

Biol. soc. Washington, 29 December, 1910, vol. 23, p. 173-174.

A new bell-bird from Auckland Island. *Proc. Biol. soc. Washington*, 24 February, 1911, vol. 24, p. 23-24.

Two new birds from the island of Molokai. *Proc. Biol. soc. Washington*, 24 February, 1911, vol. 24, p. 29-30.

A new fantail from the Chatham Islands. *Proc. Biol. soc. Washington*, 24 February, 1911, vol. 24, p. 41-42.

Descriptions of new American birds. *Proc. Biol. soc. Washington*, 23 June, 1911, vol. 24, p. 187-190.

A new swift from Palestine. *Proc. Biol. soc. Washington*, 23 June, 1911, vol. 24, p. 195-196.

REPORT ON THE BIRDS.

BY WILLIAM BREWSTER.

Two hundred and twenty-three skins and two mounted birds have been received by gift from Mr. John E. Thayer and three hundred and eighty skins from Dr. John C. Phillips. Mr. Walter Faxon has given a young Brewster's warbler, taken soon after it had left the nest, in Lexington, Massachusetts, in June, 1910. Other accessions of bird skins by gift have come from Messrs. Outram Bangs, Thomas Barbour, H. B. Bigelow, Gorham Brooks, M. A. Carriker, Jr., G. E. Hodsdon, George Nelson, and J. L. Peters.

Purchases include a hornbill (*Dichoceros bicornis*), two petrels (*Oestrelata nigripes* and *Oe. axillaris*) and upwards of one hundred skins from Finmark among which are a number of species not hitherto represented in the collections, and many young ducks and waders in interesting plumages.

Specimens have been loaned to Messrs. W. DeW. Miller, H. C. Oberholser, C. W. Richmond, Robert Ridgway, and W. E. Clyde Todd.

Exchanges have been made with the U. S. national museum and with the Carnegie museum at Pittsburgh.

PUBLICATIONS. AUGUST 1, 1910-JULY 31, 1911.

Concerning the nuptial plumes worn by certain bitterns and the manner in which they are displayed. *Auk*, January, 1911, vol. 28, p. 90-100.

The nuptial plumes of bitterns: a correction. *Auk*, April, 1911, vol. 28, p. 256.

Ceremonials of courtship practised by the American merganser. *Bird lore*, May-June, 1911, vol. 13, p. 125-127.

REPORT ON THE REPTILES, BATRACHIANS, AND FISHES.

BY SAMUEL GARMAN.

Donations to the collections of this Department have been received from Drs. Thomas Barbour, H. B. Bigelow, H. L. Clark, W. C. Farrabee, L. C. Jones, Major Wirt Robinson, and the New York zoölogical society. The contributions of the latter comprised specimens valuable for exhibition mounts and others of importance for study. The exchanges have brought in many of the more uncommon species from localities heretofore unrepresented in the Museum. Dr. Barbour's efforts in collecting and exchanging have been especially effective. A number of rarities from Japan have been acquired by purchase. Improvements and enlargements made in the cases of the storage room devoted to the reptiles and batrachians have greatly increased the capacity, and have much enhanced the convenience in use of these collections for study, besides improving their appearance in a marked degree. The increases in the catalogues and the numbers of identifications have been greater than for years past. Some of the specimens sent out to specialists for examination and study have been returned.

REPORT ON THE ENTOMOLOGICAL DEPARTMENT.

The Departmental collections have received important additions from Miss Elizabeth B. Bryant, Miss Katherine Mayo, and Messrs. G. M. Allen, Outram Bangs, Thomas Barbour, William Beutenmüller, W. F. Clapp, F. T. Dunleavy, J. H. Emerton, W. G. Farlow, A. Fenyès, C. A. Frost, A. O. Gross, R. T. Jackson, Carl Lumholtz, A. P. Morse, F. Muir, S. C. Palmer, R. T. Pearsall, F. W. Putnam, Wirt Robinson, Roland Thaxter, C. G. Weld, L. H. Weld, W. M. Wheeler, and J. B. Woodworth.

Some progress has been made in the rearrangement of portions of the Diptera, Hemiptera Heteroptera, and Odonata; also in the Cicindelidae, Carabidae, and Dytiscidae of the Coleoptera.

REPORT ON THE CRUSTACEA AND MOLLUSCA.

BY WALTER FAXON.

Accessions to the collection of Crustacea for the year are as follows:—

From Dr. G. M. Allen, *Alpheus* from Mombasa, British East Africa; from Dr. Thomas Barbour, *Squilla empusa* from Marion, Mass., *Palaemon* and *Gecarcinus* from Grenada, W. I., potamonid from Puebla, Mex., Isopoda from Eau Gallie, Fla.; from Mr. Samuel Henshaw, *Oniscus asellus* (cum pullis) from Montreal, and a miscellaneous lot of Crustacea from the New Hebrides collected by J. Annand in January, 1911; from Mr. George Nelson, *Cambarus alleni* from Fort Florida, Fla.; from Mrs. A. S. Packard, microscopical slides (*Apus*, *Eubranchipus*, *Nebalia*) from the collection of the late Prof. A. S. Packard; from Mr. R. A. Spaeth, eight species of *Cyclops* from Fresh Pond, Cambridge, Mass.

A report on the decapod Crustacea collected by Dr. Thomas Barbour in the East Indies in 1906–1907 and presented by him to the Museum has been prepared by Miss M. J. Rathbun and published by the Museum as Bulletin No. 16, Vol. LII.

Mollusca have been received from Messrs. G. M. Allen, S. S. Berry, J. H. Blake, W. F. Clapp, Mrs. Marie Binney Earl, Messrs. Walter Faxon, Samuel Henshaw, and F. S. Smith, and from the Peabody museum of archaeology and ethnology. The most important of these gifts are the W. G. Binney collection of North American pulmonate gasteropods received from Mrs. Earl, and Mr. Clapp's collection of New England and Florida shells, embracing about 1,200 lots and 420 species.

The whole of the Pyramidellidae and about one half of the Pulmonata of the Museum have been relabeled, numbered and catalogued during the year by Mr. W. F. Clapp and Mrs. N. A. Clapp. Owing to Mr. Clapp's absence from Cambridge during several months of last winter, a large measure of accomplishment in this Department is due to the untiring devotion of Mrs. Clapp.

REPORTS ON THE LOWER INVERTEBRATES. ECHINODERMS.

BY HUBERT LYMAN CLARK.

The past year has been devoted almost wholly to the Echini. The labeling and cataloguing of the collection has been completed and shows that about four fifths of the known species of Echini are represented. There are more than a hundred holotypes and nearly fifty cotypes. Besides the work on the catalogue considerable time was devoted to the completion of the manuscript for Part IV of "Hawaiian and other Pacific Echini," and to a revision of the classification of the clypeastroids.

Two weeks in August, 1910, were spent with Dr. H. B. Bigelow in marine collecting at Grand Harbor, Grand Manan. The finding near low water mark of a specimen of *Phyllophorus*, a genus of holothurians of whose American species almost nothing is known seemed to warrant further investigation. Accordingly two weeks in July, 1911, were spent at the same place and eighteen specimens of *Phyllophorus* were secured, besides a large series of the remarkable worm *Priapul*us. Considerable attention was given each summer to the problem of retaining the natural colors of starfishes when prepared for the museum. While the problem is by no means solved, no little progress was made and some fine specimens of *Henricia* were prepared which have retained their color for a year with little alteration. Altogether 373 specimens of twenty species of echinoderms were added to the collections as a result of the Grand Manan expeditions.

Aside from this material the principal additions to the collection have been donations from Dr. R. L. Jackson of many fine Echini, some in large series, and from Dr. L. E. Griffin of nearly five hundred echinoderms from the Philippine Islands, quite a number of which were real desiderata. A series of 158 specimens of fifteen species from Tongoa, Espiritu Santo, New Hebrides, was presented by Mr. Samuel Henshaw. Dr. E. A. Andrews of the Johns Hopkins University presented an *Astrophyton* and a dozen holothurians from Jamaica. Mr. W. F. Clapp donated twenty-

one specimens from Maine. A new genus of brittle-stars was obtained by exchange with the Zoological museum, Copenhagen, and very desirable series of starfishes and brittle-stars were received in exchange from the Zoological museum, Amsterdam, and the Indian museum, Calcutta. These two exchanges added ten genera and fifty-three species to the collections.

The catalogue of holothurians is not yet complete but the other four classes stood as follows at the close of the Museum year.

	Genera.	Species.	Specimens.
Crinoids	31	119	1581
Asteroids	102	440	11156
Ophiuroids	107	738	19155
Echinoids	122	418	15449
	362	1715	47341

PUBLICATIONS. AUGUST 1, 1910-JULY 31, 1911.

A new ophiuran from the West Indies. *Proc. U. S. nat. mus.*, 4 August, 1910, vol. 37, p. 665-666.

The echinoderms of Peru. *Bull. M. C. Z.*, October, 1910, vol. 52, p. 319-358, 14 pls.

The development of an apodous holothurian (*Chiridota rotifera*). *Journ. exp. zool.*, November, 1910, vol. 9, p. 497-516, 2 pls.

North Pacific ophiurans in the collection of the United States national museum. *Bull. 75, U. S. nat. mus.*, February, 1911, p. i-xvi, 1-302.

The genera of recent clypeastroids. *Ann. mag. nat. hist.*, June, 1911, ser. 8, vol. 7, p. 593-605.

ACALEPHS.

BY HENRY B. BIGELOW.

The most important accession is the duplicate set of siphonophores collected by the "Albatross" during her expedition to the Eastern Tropical Pacific, 1904-1905. This series consists of forty-four species, many of them not previously represented in the Museum. Another collection only second to the foregoing is the duplicate set of Medusae, siphonophores, and ctenophores collected by the "Albatross" in the Philippines, and presented by the U. S. bureau of fisheries. From the Australian Museum, through the courtesy of the Curator, Mr. Robert Etheridge, a valuable series of Australian Medusae has been received. Dr. A. G. Mayer has presented a collection of Medusae, beautifully preserved, from Newfoundland, and a series of Medusae, ctenophores, and hydroids was obtained by the Assistant in the Bay of Fundy. A very large specimen of *Physalia physalis* has been placed on exhibition.

During the year the collection of siphonophores has been rearranged and reidentified, and a card catalogue, of 61 species, about 3,035 specimens, prepared. This series is in an excellent state of preservation and contains about three fourths of the known species of siphonophores.

During August, 1910, through the courtesy of Mr. Joseph S. Bigelow, Jr., dredging and surface collecting was carried on by Dr. Clark and the Assistant in the Bay of Fundy near Grand Manan. During the past summer Mr. Bigelow again placed his yacht at my disposal to test a newly-devised closing net for horizontal towing. This apparatus is a combination of the Petersen and Nansen principles, and proved eminently successful. Temperatures were taken at various depths in Massachusetts Bay and the Gulf of Maine, and water samples preserved for titration. During the year I have finished the reports on the Eastern Pacific siphonophores, and on the Philippine Medusae and ctenophores.

PUBLICATIONS. AUGUST 1, 1910-JULY 31, 1911.

- Fishes and Medusae of the intermediate depths. A note on the work of the "Michael Sars." *Nature*, 8 June, 1911, vol. 86, p. 483.
- Biscayan plankton collected during a cruise of H. M. S. Research, 1900. Pt. XIII. The Siphonophora. *Trans. Linn. soc. London, Zoology*, June, 1911, ser. 2, vol. 10, p. 337-358, pl. 28.
- The work of the "Michael Sars" in the North Atlantic in 1910. [Review of Hjort's preliminary account]. *Science*, 7 July, 1911, new ser., vol. 34, p. 7-10.

REPORT ON THE GEOLOGICAL COLLECTION.

BY ROBERT W. SAYLES.

During the year models have been purchased for the dynamical and structural exhibits. A relief model, by G. C. Curtis, showing Valpariso after the earthquake of 1906, illustrates the typical manner in which masonry houses fall in heavy shocks. The idea was conceived by Professor J. B. Woodworth. A model of the frame of a Japanese earthquake-proof house, made by J. P. Deagle, under the direction of the Assistant is also on exhibition. A naturalistic model of Pulpit Rock, Eastern Point, Nahant, the first naturalistic model of a rock ever made, was purchased of G. C. Curtis.

About fifty specimens of fossils have been added to the historical collection. Eighteen photographic copies of the drawings of Charles R. Knight, illustrating extinct reptiles and mammals, have been hung in the historical cases.

Specimens of the tillite found at Hyde Park and Squantum have been placed on exhibition in the case devoted to glaciers, and for comparison, a specimen of tillite from the Cambrian or Pre-Cambrian of China, the kind gift of Bailey Willis, is also shown.

One exhibition case has been built; it is well filled with specimens illustrating jointing.

In one of the two windows between the southwest room and the hall, there have been placed six transparencies, showing the part played by water in the tearing down of the lands, as exemplified by rivers, glaciers, and waves.

In the spring of 1911, I made a trip to western Virginia, and collected a number of fossils from the Ordovician, Silurian, and Devonian systems.

PUBLICATION. AUGUST 1, 1910-JULY 31, 1911.

SAYLES, R. W., AND LA FORGE, L.

The glacial origin of the Roxbury conglomerate. *Science*, 18 November, 1910, new ser., vol. 32, p. 723-724.

REPORT ON THE LIBRARY.

During the year from August 1, 1910, to July 31, 1911, inclusive, 1,095 volumes, 1,975 parts of volumes, and 1,075 pamphlets have been added to the Library.

The total number of volumes in the Library is 48,019, the total number of pamphlets is 44,442.

Seven hundred and twenty-five volumes have been bound.

[A]

PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

FOR THE YEAR 1910-1911

BULLETIN: —

Vol. LII.

No. 16. Decapod crustaceans collected in Dutch East India and elsewhere by Mr. Thomas Barbour in 1906-1907. By Mary J. Rathbun. pp. 16. 6 Plates. September, 1910.

No. 17. The echinoderms of Peru. By Hubert Lyman Clark. pp. 40. 14 Plates. October, 1910.

Vol. LIII.

No. 5. The reactions of amphibians to monochromatic lights of equal intensity. By Henry Laurens. pp. 52. June, 1911.

Vol. LIV.

No. 2. Some West African amphibians. By Thomas Barbour. pp. 10. 2 Plates. March, 1911.

No. 3. Alexander Agassiz: His life and scientific work. By Sir John Murray. pp. 22. March, 1911.

No. 4. The genus *Blakia* Perrier. By Walter K. Fisher. pp. 6. 2 Plates. March, 1911.

No. 5. Ants collected in Grenada, W. I. by Mr. C. T. Brues. By William Morton Wheeler. pp. 8. May, 1911.

No. 6. Mammals of the West Indies. By Glover M. Allen. pp. 92. July, 1911.

MEMOIRS: —

Vol. XXV.

No. 3. Some new American fossil crinoids. By Frank Springer. pp. 48. 6 Plates. July, 1911.

Vol. XXVI.

No. 7. Reports on the scientific results of the expedition to the Tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., commanding. XIII. The shore fishes. By William C. Kendall and Edmund L. Goldsborough. pp. 106. 7 Plates. February, 1911.

Vol. XL.

- No. 2. Brewster's warbler. By Walter Faxon. pp. 24. 1 Plate. January, 1911.

Vol. XLI.

- No. 1. Reports on the scientific results of the expedition to the Eastern Tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N., commanding, and of other expeditions of the "Albatross," 1888-1904. XXI. The sponges. 1. The Geodidae. By Robert von Lendenfeld. pp. 260. 48 Plates. August, 1910.

- No. 2. Reports on the scientific results of the expedition to the Eastern Tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N., commanding, and of other expeditions of the "Albatross," 1888-1904. XXI. The sponges. 2. The Erylidae. By Robert von Lendenfeld. pp. 63. 8 plates. September, 1910.

Vol. XLV.

- No. 1. Reports on the scientific results of the expedition to the Tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from August, 1899, to June, 1900, Commander Jefferson F. Moser, U. S. N., commanding. XIV. The Solenogastres. By Harold Heath. pp. 180. 40 Plates. June, 1911.

REPORT: —

1909-1910. pp. 48. 4 Plates. December, 1910.

[B]

INVESTED FUNDS OF THE MUSEUM.

IN THE HANDS OF THE TREASURER OF HARVARD COLLEGE.

Gray Fund	\$50,000.00
Permanent Fund	117,469.34
Humboldt Fund	7,740.66
Sturgis Hooper Fund	107,391.03
Agassiz Memorial Fund	297,933.10
Teachers and Pupils Fund	7,594.01
Virginia Barret Gibbs Fund	5,945.19
Willard Peele Hunnewell Memorial Fund	5,000.00
Maria Whitney Fund	5,830.57
Alexander Agassiz Fund	99,500.00
“ “ Expedition Fund	94,794.56
	<hr/>
	\$799,198.46

The payments on account of the Museum are made by the Bursar of Harvard College, on vouchers approved by the Curator. The accounts are annually examined by a committee of the Overseers. The only funds the income of which is restricted, the Gray, the Humboldt, the Maria Whitney, and the Alexander Agassiz Expedition Funds, are annually charged in an analysis of the accounts, with vouchers, to the payment of which the income is applicable.

The income of the Gray Fund can be applied to the purchase and maintenance of collections, but not for salaries.

The income of the Humboldt Fund (about \$300.) can be applied for the benefit of one or more students of Natural History, either at the Museum, the United States Fish Commission Station at Woods Hole, the Stations at Bermuda, or the Tortugas.

The income of the Maria Whitney Fund can be applied for the care (binding) and increase of the Whitney Library.

The Alexander Agassiz Expedition Fund was bequeathed by Alexander Agassiz for the publication of reports on collections brought together by the expeditions with which he was connected.

The income of the Virginia Barret Gibbs Scholarship Fund, of the value of \$250., is assigned annually with the approval of the Faculty of the Museum, on the recommendation of the Professors of Zoölogy and of Comparative Anatomy in Harvard University, “in supporting or assisting to support one or more students who may have shown decided talents in Zoölogy, and preferably in the direction of Marine Zoölogy.”

Applications for the tables reserved for advanced students at the Woods Hole Station should be made to the Faculty of the Museum before the 1st of May. Applicants should state their qualifications, and indicate the course of study they intend to pursue.

